Introduction of Mindfulness in an Online Engineering Core Course During the COVID-19 Pandemic

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ABSTRACT

The onset of the COVID-19 pandemic created and exacerbated numerous stressors for students, who already report high levels of stress. In transitioning an upper-level engineering core course to remote delivery, we invited interested students to participate in short mindfulness activities at the end of each synchronous class session. Students shared that they found the activities to be beneficial and indicated appreciation for the demonstrated care the instructor expressed for students, even if they did not participate. Lastly, multiple students specifically commented on the welcome timing of the activities given the high levels of stress due to the pandemic.

Key words: Mental health, Stress, Distance learning

INTRODUCTION

Before COVID-19, colleges were grappling with a mental health crisis (Kruisselbrink Flatt 2013, Wood 2012). Alarming numbers of students report high levels of stress, anxiety, and depression (Lipson and Eisenberg 2018, Brown 2016, Lipson, Lattie, and Eisenberg 2019). Research indicates stress and anxiety negatively impact student experience (Burt and Paysnick 2014, MacGeorge, Samter, and Gillihan 2005, Hudd et al. 2000), academic performance (Burt and Paysnick 2014, Pritchard and Wilson 2003), and retention (Lipson and Eisenberg 2018). Further, recent evidence suggests the mental health crisis is particularly acute in engineering (Danowitz and Beddoes 2018) and that students may associate studying engineering with poor mental health (Jensen and Cross 2019). The rapid onset of the COVID-19 pandemic introduced countless additional stressors for students, from abrupt moves to online learning to financial hardship.

Mindfulness, the practice of being aware in the current moment, can reduce anxiety and depression, and improve one's ability to cope with stress (Donald and Atkins 2016, Masuda and Tully 2012). Implementing mindfulness into curricula can improve student mental health, by reducing the perception of stress (Caldwell et al. 2010, Ramler et al. 2016), lowering anxiety (Bellinger, DeCaro, and Ralston 2015), and improving mood and sleep (Caldwell et al. 2010). First-year students participating in a mindfulness course showed better adjustment to college than peers who did not (Ramler et al. 2016), suggesting a pathway to improve retention. Mindfulness supports academic performance, with studies showing trait mindfulness increases after interventions and is related to lowered test anxiety (Bellinger, DeCaro, and Ralston 2015), improved mathematical problem-solving (Rosenstreich and Margalit 2015), and calculus exam scores (Bellinger, DeCaro, and Ralston 2015). Inspired by previous efforts to offer mindfulness to engineering students (Huerta 2018, Ge et al. 2019), we describe how mindfulness was integrated into the online delivery of an upper-level engineering core course on transport phenomena. We share student feedback and our reflections for instructors to consider in offering mindfulness to engineering students in an online course.

METHODS

After the course moved online, optional mindfulness activities were played at the end of each synchronous class session. The course format is summarized in Table 1. Offering the activities at the conclusion of class allowed for students to choose whether or not to participate by remaining on Zoom. Participants could turn off their video if they preferred and the instructor left her video on. Mindfulness recordings were played after each class using the Headspace app[1] (Table 2) and the instructor participated with the students. In response to student requests, the instructor scheduled a mindfulness session before the final exam.

Table 1. Course summary.

	Pre-COVID	Post-COVID
Course Schedule	Three 50-minute sessions per week	Three 50-minute sessions per week
Course Meetings	In person	Zoom and Zoom breakout rooms
Synchronous Class Activities	Lecture Discuss problem solving guides Group problem solving	Review lecture Discuss problem solving guides Group problem solving Mindfulness activities (optional)
Asynchronous Class Activities	None	Pre-recorded lectures

[1] The Headspace app can be accessed at https://www.headspace.com/. The website includes information about mindfulness exercises as well as access to recordings.

Table 2. Summary of mindfulness activities.

Headspace activity	Description	Sample Instructions[1]	Length (minutes)
Focus	Use visualization techniques to focus on an object.	"Slowly, gently focusing in on that one thing" "Resting your mind there"	3
Breathe	Use noting techniques to acknowledge interruptions to attention and then let them go as you come back to focusing on breath.	"Noting when the mind has wandered off. Gently coming back again"	3
Reset	Use resting awareness techniques to recharge the mind as you let your experiences and thoughts from the day come and go.	"As you breathe out just an idea, a sense, of letting go" "Allowing thoughts to come and go"	3
Taking a Break	Use resting awareness techniques to take a moment in your day to relax and let your mind think freely.	"Let your mind do whatever it wants to do"	3
Restore	Use focused attention techniques to relax as you use your breath as the object of focus.	"Slowly becoming more aware of that breath" "Resting the mind on the breath"	3
Unwind	Use body scan techniques to unwind as you bring your attention to different body parts.	"Imagining different parts of the body switching off, shutting down, allowing the body to unwind"	3
Refresh	Use visualization techniques to focus on an image of sunlight washing over you.	"Imagining a steady stream of warm sunlight flowing down into the body"	3
Exam Prep	Use resting awareness techniques to relax and prepare your mind for an exam.	"Following the breath, knowing that you've done everything you can to prepare, knowing all that all the information you need is there"	5

[1] Headspace app

PRELIMINARY RESULTS

Student participation is summarized in Table 3. While the number of students participating varied, we estimate about half of the enrolled students participated at least once in the 16 sessions. The pre-exam session had the largest number of participants. Twenty end-of-semester course evaluations were received, and 12 provided comments about the mindfulness activities. Two main themes emerged from the student feedback: instructor care and student benefit (Table 4). Two students who indicated they did not participate shared appreciation for the exercises and instructor care for student wellbeing. No students provided negative feedback and one student suggested improving audio quality. The average final exam score was

Table 3. Summary of student participation.

Session	Participation (62 enrolled)
Synchronous Class	~50% of enrolled students
After Class Mindfulness	~15-25% of enrolled students
Pre-exam Mindfulness	~30% of enrolled students

Table 4. Themes from student feedback on integration of mindfulness activities into the online course.

Themes	Number of evaluations	Example Student Comments
Instructor care	2	"I found them very peaceful and a clear indicator that the professor cared about the wellbeing of her students."
		"I appreciate (the instructor's) willingness and intentional effort to provide these activities for students, although I did not take part in them myself."
Student benefit	12	"I really enjoyed them and though they were a nice addition to the class, especially given the challenging circumstances of online learning."
		"Dedicated time to focus on yourself when so much is going on regarding classes and in the outside world was extremely valuable."
		"The mindfulness activities were a nice addition to the course to spend a few minutes after class letting our minds rest."
		"…the mindfulness activities I did attend set a great tone for the rest of the day and really helped me relax and feel more focused. I loved these activities and hope to start incorporating them into my own life."

comparable to previous semesters. However, we feel that we are unable to make a formal comparison due to multiple confounding factors, including the alternate course delivery (Table 1) and exam format.

Instructor Reflection

I (second author/instructor) offered the mindfulness activities to help students manage stress. I was initially hesitant due to concern of students believing the activities did not belong in an engineering course. While not all students participated, I observed that the activities fostered student-instructor interactions, which could promote instructor and social presence in online classrooms (Richardson et al. 2015). Adding the mindfulness activities to the class provided me a way to connect with students and encourage them to prioritize their wellness during a difficult time. While COVID-19 prompted this offering, I plan to offer mindfulness in my future courses both during and after the pandemic to relieve student stress and promote reflection (Ambrose 2013).

Student Reflection

Mindfulness is something I (first author/student in the course) have practiced on my own before, but never with others or part of a course. It was surprising to have an instructor reach out to the class in this way, and it was the only time any of my instructors offered a wellness activity during class. The sessions themselves were relaxing, but it was also comforting to be coming together as a class since we cannot be with each other in person during this stressful time. Just having the instructor offer mindfulness activities made students feel supported because it showed the instructor cared about students outside of academics.

NEXT STEPS

Here we describe a simple way to promote wellness in the online classroom and demonstrate care for students during a challenging time. The online format offered students privacy, since students could connect without sharing video. While the present work has several limitations, including self-selection and limited responses from non-participating students, student response was positive and demonstrated interest in wellness activities integrated into a class. In our future work with incoming first-year students, we plan to collect longitudinal data including student attitudes about mindfulness, help-seeking behavior, test scores, and ability to be mindful[2] (Brown and Ryan 2003). We further plan to collect data from non-participating students to ask why they chose not to participate. In future course offerings, the instructor will provide students additional mindfulness resources, including research studies showing benefits of the practice. Overall, wellness activities integrated into curricula may promote cultures of student wellness, changing the engineering narrative from one of "suffering and shared hardship" (Godfrey and Parker 2010) to one of thriving (Ge and Berger 2018).

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[2] Mindful Attention Awareness Scale (MAAS)

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